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DATE MAILED: 12/16/2002

| APPLICATION NO.                               | FILING DATE   | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.   | CONFIRMATION NO. |  |
|---|---------------|----------------------|-----------------------|------------------|--|
| 09/696,523                                    | 10/23/2000    | Ji Su                | 16219-1               | 4896             |  |
| 75  | 90 12/16/2002 |                      |                       |                  |  |
| ROBIN W. EDWARDS                              |               |                      | EXAMINER              |                  |  |
| NASA LANGLEY RESEARCH CENTER<br>MAIL STOP 212 |               |                      | BUDD, MARK OSBORNE    |                  |  |
| 3 LANGLEY B<br>HAMPTON, V                     |               |                      | ART UNIT PAPER NUMBER |                  |  |
| HAMPION, V                                    | A 23001-2133  |                      | 2834                  |                  |  |

Please find below and/or attached an Office communication concerning this application or proceeding.

|  | A   | A   |   |                                  |
|--|---|---|---|----------------------------------|
|  | Application No. Applicant(s)  Su et al  |   | et d  |                                  |
| Office Action Summary  | Examiner  |   | Group Art Unit  | ·                                |
| •  | M. Bud)   |   | 2834  |                                  |
| -The MAILING DATE of this communication appears  | on the cover sheet be   | neath the co  | rrespondence ad   | ldress—                          |
| Period for Reply   | 3   |   |   |                                  |
| A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO OF THIS COMMUNICATION.  |   |   | FROM THE MA   |                                  |
| <ul> <li>Extensions of time may be available under the provisions of 37 CFR 1. from the mailing date of this communication.</li> <li>If the period for reply specified above is less than thirty (30) days, a regent NO period for reply is specified above, such period shall, by default,</li> <li>Failure to reply within the set or extended period for reply will, by statuent and the period by the Office later than three months after the mailing term adjustment. See 37 CFR 1.704(b).</li> </ul>  | oly within the statutory min<br>expire SIX (6) MONTHS fro<br>tte, cause the application t | imum of thirty (3<br>om the mailing da<br>o become ABAN | 0) days will be considered of this communicate of this communicate (35 U.S.C. § | dered timely.<br>ation.<br>133). |
| Status  Responsive to communication(s) filed on $11 - 8 - 0$   | 7   |   |   | ·                                |
| √This action is <b>FINAL</b> .   |   |   |   |                                  |
| ☐ Since this application is in condition for allowance except accordance with the practice under Ex parte Quayle, 1935   | for formal matters, <b>pro</b><br>C.D. 1 1; 453 O.G. 213                                  | secution as t   | o the merits is c   | losed in                         |
| Disposition of Claims  |   |   |   | •                                |
| Claim(s)   |   |   |   |                                  |
| Of the above claim(s)  | is/are v  | is/are withdrawn from consideration.                    |   |                                  |
| Claim(s) 1-7 and 14  |   | is/are a  | illowed.  |                                  |
| X Claim(s) 1-1 and 19  | is/are r  | is/are rejected.  |   |                                  |
| □ Claim(s)   |   |   |   |                                  |
| □ Claim(s)   |   | are sub<br>require                                      | oject to restriction<br>ment  | or election                      |
| Application Papers  ☐ The proposed drawing correction, filed on  | is □ approved   | •   |   |                                  |
| ☐ The drawing(s) filed on is/are object  |   |   |   |                                  |
| ☐ The grawing(s) filed on is all object.   | led to by the Examiner  |   |   |                                  |
| ☐ The oath or declaration is objected to by the Examiner.  |   |   |   |                                  |
|  |   |   |   |                                  |
| Priority under 35 U.S.C. § 119 (a)–(d)  Acknowledgement is made of a claim for foreign priority under the control of the contr | nder 35 U.S.C. § 119 (a   | a)–(d).   |   |                                  |
| ☐ All ☐ Some* ☐ None of the:   |   |   |   |                                  |
| ☐ Certified copies of the priority documents have been re  | eceived.  |   |   |                                  |
| ☐ Certified copies of the priority documents have been re  | eceived in Application I  | No  | •   |                                  |
| □ Copies of the certified copies of the priority documents   |   |   |   |                                  |
| in this national stage application from the International *Certified copies not received:  |   |   |   | ·                                |
| Attachment(s)  |   |   |   |                                  |
| ☐ Information Disclosure Statement(s), PTO-1449, Paper No.   | o(s)  | Interview Sum   | mary, PTO-413   |                                  |
| Notice of Reference(s) Cited, PTO-892  |   | ☐ Notice of Informal Patent Application, PTO-152        |   |                                  |
| ☐ Notice of Draftsperson's Patent Drawing Review, PTO-94   | 8 🗆   | □ Other   |   |                                  |
|  | ction Summary   |   |   |                                  |

U.S. Patent and Trademark Office PTO-326 (Rev. 11/00)

Part of Paper No.

Art Unit: 2834

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1, 4 and 5 are rejected under 35 U.S.C. 102(a) as being anticipated by Vorie, Benecke or Eycke.

Note Eycke (fig. 2), membrane #34 support base #42, #44, electro-active bender #36 and connecting means for operatively and nonrigidly connecting the membrane to the bender. In Benecke, note benders #1-4, base #5, connection means (frictional contact) and membrane (the unnumbered thin moveable member). In Vorie, see fig. 3 for similar elements e.g. Support #42, bender #14, non rigid connector #46 and membrane #40.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benecke, Eycke and Vorie.

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The references teach the claimed structure except for some specific materials has long been held to be within the skill expected of the routineer. Thus to select adhesive for fastening or a polymer for the piezo materials would have been obvious to one of ordinary skill in the art.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vorie, Benecke or Eycke in view of Mcnaney, Ivanov or Assard.

Vorie, Benecke and Eycke teach the claimed structure using either a single bender actuator or less than three in contact at any given time. The more duplication of parts has long been held to be within the skill expected of the routineer. Further, each of Assard, Ianov and Mcnaney teach using multiple bender elements operatively and nonrigidly connected to manipulate an element. Thus in consideration of the above it would have been obvious to one of ordinary skill in the art to use multiple benders to manipulate a membrane.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vorie, Benecke or Eycke in view of Sawyer, Palo or Adler.

Each of Vorie, Eycke and Benecke teach the basic device but use benders of uniform thickness. However, Sawyer, Palo and Adler each teach providing a piezo bender with nonuniform thickness to alter output and increase the strength of the element. Thus, for at least this reason, it would have been obvious to one of ordinary skill in the art to use variable thickness bender elements in Vorie, Eycke or Benecke.

Claims 8-13 are allowed.

Further cited of interest are Peterman and Bowen.

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THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Budd/ek

12/13/02

PRIMARY EXAMINER